Energy for Sustainability 2015
Sustainable Cities: Designing for People and the Planet
Coimbra, 14-15 May, 2015

The drive towards near Zero Energy Buildings through Professional Training in Portugal – The SouthZEB Project

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Keywords: Energy Efficiency, Market Barriers, Zero Energy Buildings, Renewable Energy Systems, SouthZEB Project

Abstract: With the objective of fostering the energy efficiency of the building sector as well as of the integration of renewable energy sources, the adoption of near Zero Energy Buildings (nZEB) concepts (buildings that have a very high energy performance) in new and in existing buildings, is currently being promoted by the SouthZEB project. This Project, initiated in March 2014, is developing, in 30 months, certified training modules targeted towards engineers, architects, municipality technicians and decision makers in Southern European countries, including Portugal.

Training modules definition considers the experience and know-how of the front-runner countries (Austria, UK and Northern Italy) participating in the project, but are also based on the counselling of representatives of the main nZEB stakeholders in each of the Southern European countries partnering the SouthZEB project (Portugal, Italy, Greece and Cyprus), the so-called SouthZEB National Support Groups.

This paper, first, elaborates on the nZEB concept and its adoption evolution in Europe. Secondly, it focuses on the need for professional training, which has been a barrier encountered in nZEB progress in Southern European countries. Finally, the paper presents the certified training development methodology followed by the SouthZEB project, with a particular focus in the Portuguese experience.

Acknowledgements: SouthZEB Project is co-funded by the Intelligent Energy Europe Programme of the European Union IEE/13/393/SI2.675576 and the sole responsibility for the content of this paper lies within the authors. It does not necessarily reflect the opinion of the European Union. Neither the EASME nor the European Commission are responsible for any use that may be made of the information contained herein. More information can be consulted in www.southzeb.eu.

1. TOWARDS 2020 NEARLY ZERO ENERGY BUILDINGS IN EUROPE

The term nearly Zero Energy Building (nZEB) means a building that has very high energy performance. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby [2].

The EU's Energy Performance of Buildings Directive (EPBD), introduced in 2002 and recast in 2010, is the main legislative instrument for improving the energy performance of the European building stock. The main results from this directive (EPBD, 2010/31/EU) across all Europe are a tighter energy performance regulation for construction, rehabilitation and renovation, building certification schemes and certification and inspections for heating, ventilation and air-conditioning systems. As established by the EPBD directive recast, by 2020, all new buildings constructed in Europe must be nZEB and, from 2019 onward, new buildings occupied and owned by public authorities should be nZEB buildings.

Parallel to the requirements of the (EPBD, 2010/31/EU) directive, the Energy Efficiency (EED, 2012/EC/27/EU) directive establishes a common framework of measures for the promotion of energy efficiency within the European Union in order to ensure the achievement of the 2020 20% headline target. The measures focus on the public transport and building sectors, where the potential for savings is greatest. The public sector shall lead in the building sector by renovating 3% of buildings owned and occupied by the central governments starting from 1st January of 2014 and by including energy efficiency considerations in public procurement, so as to purchase energy efficient buildings.

Finally, the Renewable Energy Directive (RED, 2009/28/EU) also sets requirements related to buildings. The (RED, 2009/28/EU) directive stipulates that: by 2014 all Member States' building regulations and codes will require the use of minimum levels of energy from renewable sources in new buildings and in existing buildings that are subject to major renovation; and that, from 2012 onwards, member states ensure that new and existing public buildings that are subject to major renovation, at national, regional and local level fulfil an exemplary role in the context of this directive.

nZEB is not a technical standard but a policy requirement leading to the tightening of future buildings' standards. Among some of the already existing building standards that contribute to nZEB are the Passive House, Minergie, Plus Energy, Effinergie, Zero Energy, among others [3].

Specific definitions and implementation on nZEB is decided by each member state and there is currently a strong need for more guidance and common understanding for implementing sustainable but yet feasible nZEB definitions [1, 3]. In March 2013, according to the Concerted Action Energy Performance in Buildings [4] from a total of 19 EU countries that provided detailed information, six had their nZEB application fixed in a legal document and other six had the application ready but not yet legally fixed. The remaining seven countries were at various stages of developing the application of the nZEB definition, with national studies performed, under evaluation or with studies underway.

Barriers regarding know-how for a number of professionals have been identified as one of the reasons to lag behind in the adoption of nZEB concepts in the sector. This is the well-known case in Southern European countries, namely Portugal. To date in Germany, 1% of all new buildings are built according to the Passive House standard. Therefore, it can be assumed that at EU level the percentage is smaller

than 1%. Even considering that nZEB is not necessarily equivalent to a passive house, but close to the energy level of Passive Houses, the factor by which the deployment of nZEBs across Europe should increase can be assumed to be beyond 100 [3].

2. NEAR ZERO ENERGY BUILDINGS TRAINING IN SOUTHERN EUROPE

In order to reach the required level of very low energy buildings it is necessary to improve the skills and to expand the number of building professionals - from architects, construction engineers to installers and other workers. Without systematic efforts at overcoming this barrier, it will be difficult to achieve the nZEB expectations in the Southern countries of Europe. A successful implementation of nZEB buildings will also need technology transfer within the EU. This is especially important for technologies to reduce heating and cooling demand [3].

The SouthZEB project aims to contribute to the application and successful implementation of the above mentioned EU directives. The main objective is to support the building sector intermediate and senior professionals in the Southern European countries (focusing on Greece, Cyprus, Italy and Portugal) to keep up to date with the market progression. To this end, the project is focused in the design and development of the training modules and of the assessment of the programmes for these professionals. To support the large scale roll-out of the developed programmes, the project is also engaged in training specialized trainers in order to enable multiplication effects in the direct transfer of knowledge to the stakeholders. Moreover, the Project will make the educational and certification programmes available through a unique e-learning portal, available in five EU languages. Also the course level of the modules are compatible with European Qualification Framework (EQF) at level 4. The SouthZEB project addresses the Intelligent Energy Europe priority on Continuous Professional Development [6].

The expected results from the SouthZEB Project is to train at least 1,500 professionals, on the whole, including 150 trainers, which have been divided among the four different countries according to the respective number of building professionals. In Portugal, approximately 26 trainers and 260 trainees shall be trained. Also, the SouthZEB Project expects to achieve at least 3,000 user registrations in the e-learning platform.

2.1. Methodology: an Integrative Design of nZEB Training Modules Contents

A set of design meetings have been organized in the four Southern European countries to assess specific training and certification needs on each country to the local context. The design meetings have been typically attended by key stakeholders on the building and energy efficiency areas and also representatives from national architects or engineer associations, energy agencies, universities, research centers and private sector companies that together constitute a Focus Group entitled National Support Group (NSG) to the SouthZEB project. Also, an Experts Advisory Board has been constituted to assist the project, despite that the Experts Advisory Board plays an important role in a broader scale of the project implementation, such as the development of the e-learning portal and the training modules of the project, and in the evaluation of its outcomes. Figure 1 identifies the timetable followed in the Design Meetings in each country.

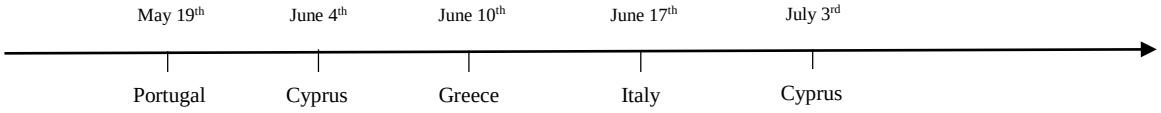

Figure 1 – Design Meetings schedule in the four target countries

In Portugal, NSG has been created encompassing representatives of the main entities working on the field, including representatives from the key professional associations, present in the design meeting, as described in Table 1.

ADENE (National Energy Agency) – Rui Fragoso, Jorge Marques
LNEC (National Laboratory for Civil Engineering) – Pina dos Santos
LNEG (National Laboratory for Energy and Geology) – Laura Aelenei
Lisboa E-Nova (Municipal Company) – Miguel Águas
iiSBE-PT (International Initiative for a Sustainable Built Environment) – Luís Bragança
IST (Technical University of Lisbon) – Manuel Guedes, Miguel Carvalho, Ricardo Gomes
Ordem dos Arquitetos (National Association of Architects) – Carmo Caldeira
Ordem dos Engenheiros (National Association of Engineers) – Cristina Machado
Ordem dos Engenheiros Técnicos (National Association of Technical Engineers) – José Manuel Sousa
UMinho (University of Minho) – Manuela Almeida

Table 1 – SouthZEB Portuguese National Support Group

The Portuguese Design Meeting was jointly organized by Instituto Superior Técnico (IST) and Universidade do Minho (UMinho) and held on May 19th at IST, in Lisbon. Prior to the gathering, attendees were provided with a brief presentation of the SouthZEB project and a description of the training modules foreseen in its Grant Agreement. During the meeting, all participants were requested to give their opinion in terms of the training modules proposed, their suitability to the national context and what could be improved in terms of contents and structure. After the meeting, a questionnaire was sent to each of the present members in order to gather the feedback and better answer to some of the main issues discussed regarding the training modules content and structure.

Based on the joint assessment of all four design meetings in Portugal, in Greece, in Italy and in Cyprus, a total of ten revised training modules have been defined and are summarized in Table 2 [5 and 6].

Module	**Name**	**Hours**	**Target Audience**
Module 1	nZEB Basic module	20h	Engineers, architects
Module 2	nZEB Advanced module	40h	Engineers, architects
Module 3	Thermal bridging	20h	Engineers, architects
Module 4	Thermal Comfort	20h	Engineers, architects
Module 5	SouthZEB framework module and local architectural regulations	30h	Engineers, architects, municipal employees
Module 6	nZEB simulation and design software module	30h	Engineers, architects, building technicians
Module 7	Low carbon technology and automation for nZEB	20h	Engineers, architects, building technicians
Module 8	Retrofitting towards nZEB	40h	Engineers, architects, municipal employees
Module 9	Construction management and field supervision of nZEB	40h	Professionals from construction sector
Module 10	Preparation of funding schemes and other incentives for nZEB	20h	Municipalities, local/ national authorities

Table 2 – nZEB training modules defined by the SouthZEB Project

Moreover, several adjustments have been agreed relative to the initial modules descriptions. Among them, modules 1 and 2 became mandatory for all participants and a minimum number of 4 training modules (out of the remaining 8 available) need to have positive evaluation on the exam to receive the certificate. Also, several new nZEB related topics have also been either incorporated in the existent modules or new modules have been created to address those suggestions. This is the example of the renewed Module 4 and Module 7, as according to Table 2 [6].

Currently the project partners are planning the training modules sessions. These first will be directed towards training the trainers, during the second semester of 2015 and, after that, towards training the trainees. The structure of each training module in both types of sessions will involve hours for each of the following learning tasks: i) preparation, involving on-line introduction, competence assessment and background reading; ii) class based training, involving delivery by a trainer of the main components of the training; iii) post classroom based training and self-learning, which can include on-line/video; iv) finally, a competences assessment. The timetable definition is under appreciation.

3. CONCLUSIONS

The SouthZEB Project training modules aim at encountering the specific building sector market needs at regional and local level as well as to address the most important concepts developed within the near Zero Energy Building frame. To this end, a series of relevant institutions and professionals in the buildings and energy efficiency fields have been involved in the educational contents definition process. This included the formal constitution of four Focus Groups – one in each Southern European country partnering the SouthZEB Project, entitled National Support Groups (NSG) - to advise. The convergence of diverse views was found through discussions carried at the four national design meetings held.

One of the main challenges ahead is reaching the maximum number professionals to engage in the training sessions in order to fulfil the goal of the Project and effectively disseminate knowledge.

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